

## REMARKS/ARGUMENTS

Claims 17 and 38-47 were allowed in the Final Office Action dated October 15, 2003. Hence none of the following remarks apply to these allowed claims.

Claims 1-10, 16 and 48-52 stand rejected. Specifically, Claims 1-19, 16, and 48-51 stand rejected as being anticipated by U.S. Patent 6,489,624 granted to Ushio et al. The Examiner described the anticipation rejection in the bottom half of page 2 and top half of page 3 of the Final Office Action. Applicants note that the Examiner's remarks are identical to the remarks in the previous Office Action dated March 20, 2003 except for the following "forming an angle  $\theta$  with a longitudinal direction of the sidewall with an angle  $\theta > 45^\circ$ ." See the middle of page 3 of the Final Office Action dated October 15, 2003.

In addition, the Examiner stated at the top of page 5 of the Final Office Action dated October 15, 2003 that Applicants' argument regarding failure of Ushio et al. to disclose any orientation of a direction of polarization relative to the feature is not persuasive because Ushio et al.'s "Fig. 6 clearly discloses a direction other than parallel to the longitudinal direction of the feature." In the just-quoted remark, the Examiner did not explicitly state that the "direction" in the remark is the polarization direction. To the extent any direction other than polarization direction is meant, the Examiner's remark is irrelevant to the claimed invention. Therefore, the following remarks assume the Examiner meant to say "Fig. 6 clearly discloses a **polarization direction** other than parallel to the longitudinal direction of the feature" (emphasis added).

Applicants submit that the Examiner has mischaracterized the teaching of Ushio et al. regarding the direction shown in Fig. 6. Specifically, the direction shown in Fig. 6 by Ushio et al. is described therein as being the **direction of incidence** and **not direction of polarization**. For example, Ushio et al. state at column 14, lines 42-45:

Probe light (arrow 33) is incident on the  
wafer at an angle  $\theta$ . Reflected probe light (i.e.

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signal light, arrow 34) reflects from the irradiated surface at an angle  $\theta$  substantially equal to the angle of incidence.

As seen from the above-quoted text, Ushio et al.'s angle  $\theta$  is the angle of incidence. There is no indication whatsoever in Fig. 6 or in the related description (quoted above) that  $\theta$  denotes the direction of polarization.

As will be apparent to the skilled artisan, a polarization direction (if present in probe light 33) cannot be same as the direction of incidence (at angle  $\theta$ ), because the polarization direction is in a plane perpendicular to the direction of propagation. The Examiner's statement that Ushio et al. disclose the polarization direction forming an angle  $\theta$  with a longitudinal direction of the sidewall with an angle  $\theta > 45^\circ$  is clearly contradicted by the above-quoted teaching from Ushio et al. that  $\theta$  is the angle of incidence. Therefore, not only do Ushio et al. fail to disclose or suggest any specific polarization direction, but in fact Ushio et al. teach contrary to the Examiner's statement. In view of the above remarks, Applicants respectfully request the Examiner to withdraw the anticipation rejection of Claim 1 over the teachings of Ushio et al.

Applicants also submit that Ushio et al. do not disclose or suggest Claim 1's polarization direction in Ushio et al.'s Fig. 6 for the following reason. Specifically, from the above-quoted description and from Fig. 6, it appears that Ushio et al.'s probe light 33 could be just as easily unpolarized as it could be polarized. As is well known in the art, for unpolarized light, there is no specific direction of polarization of a majority of the energy. Even assuming arguendo that Ushio et al. suggest that a majority of energy of probe light 33 in Fig. 6 is to be polarized, there is no indication whatsoever in Fig. 6 and in the related description (quoted above) as to whether polarization should be circular or elliptical or linear. Even assuming arguendo that a majority of energy of probe light 33 is to be elliptically polarized or linearly polarized, there is no indication that any particular direction of polarization is to be preferred over any other direction. For example, the direction of polarization of probe light 33

in Ushio et al.'s Fig. 6 could just as easily be (a) in the plane of the paper, (b) perpendicular to the plane of the paper (of illustration in Fig. 6), and (c) in any direction therebetween. Moreover, Ushio et al. fail to disclose a majority of energy of probe light 33 in Fig. 6 being polarized in any specific direction, relative to the feature.

Hence, it does not necessarily follow from the teachings of Ushio et al. that a polarization direction is present in Fig. 6, and furthermore it does not necessarily follow that if present the polarization direction has any specific orientation relative to the feature. For one or more of the above-discussed reasons, Applicants respectfully submit that all rejected Claims 1-10, 16 and 48-52 are patentable over the teachings of U.S. Patent 6,489,624 granted to Ushio et al.

Applicants hereby submit that the Examiner has failed to take note of and answer each of several arguments in Applicants' prior amendment dated June 20, 2003. First, in the middle of page 14 of this amendment, Applicants argued that the word "polarized" was not found in the language being relied upon by the Examiner to reject Claim 1. In the Final Office Action, when rejecting Claim 1, the Examiner merely cited to Fig. 6 but did not identify a specific column and line number in the teachings of Ushio et al. wherein probe light 33 is described as being polarized. Failure to respond to Applicants' argument is clear error. **See MPEP 707.07(f), which states "Where the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it."** The Examiner has failed to cite even a single line in a single column of Ushio et al. for teaching the direction of polarization of Claim 1.

Second, in the Final Office Action, the Examiner did not also respond to Applicants' traversal of the rejection of Claim 2 in the prior amendment dated June 20, 2003. Specifically, Applicants pointed out at the top of page 17 of this amendment that the text in Ushio's Col. 22, lines 42-47 merely states that Ushio's detector is moved but does not identify the direction of movement and its relation to the direction of the feature. Once again, the Examiner failed to cite a specific column number and line number wherein Ushio et al. identify the direction of movement and its relation to the direction of the feature. This is clear error per MPEP 707.07(f).

Third, in the Final Office Action, the Examiner also did not respond to Applicants' traversal of the rejection of Claim 16 in the prior amendment dated June 20, 2003. Specifically, Applicants had pointed out at the top of page 18 of this amendment that the text in Ushio's Col. 22, lines 48-64 merely states that Ushio is performing a measurement. Again, the Examiner has failed to cite a specific column number and line number wherein Ushio et al. indicate that a process parameter for forming a conductive layer is to be changed. This is clear error per MPEP 707.07(f).

Fourth, the undersigned had traversed the rejection of Claim 10 in the prior amendment dated June 20, 2003, at page 18 that there was no support whatsoever for comparison of measurements in Examiner's citations to McCoy's teachings, namely Col. 7, lines 19-37, Col. 8, lines 6-7 and Col. 8 lines 20-24. However, once again the Examiner merely repeated the previous rejection in the Final Office Action, and did not respond to Applicants' traversal. This is clear error per MPEP 707.07(f).

Fifth, the undersigned had pointed out in relation to Claim 10 in the prior amendment dated June 20, 2003 that the Examiner's motivation for combination was impermissibly broad. Applicants stated that it is unlikely that a skilled artisan would draw any connection between measuring thickness of metal coatings on sidewalls of grooves etched into an insulator and measuring properties of photoresist sidewalls, because they are two different kinds of measurements. The undersigned also argued that McCoy is from an unrelated art because Ushio discloses an optical measurement system whereas McCoy describes using an Atomic Force Microscope probe tip to make measurements for dense photoresist patterns. However, in the Final Office Action, the Examiner totally ignored these two arguments, and merely repeated the previous rejection. This is clear error per MPEP 707.07(f).

In re-considering the prior art and Applicants' claims, the Examiner is hereby requested to understand the orientation relationship between (a) polarization direction of energy in beam and (b) direction of a feature, as recited in Claim 1, as well as the reasons therefor. The need for an Examiner to carefully consider what Applicants have invented, is stated in MPEP 2106 which is reproduced below in pertinent part (emphasis added):

## II. DETERMINE WHAT APPLICANT HAS INVENTED AND IS SEEKING TO PATENT

It is essential that patent applicants obtain a prompt yet complete examination of their applications. ...

Deficiencies should be explained clearly, particularly when they serve as a basis for a rejection. ... A failure to follow this approach can lead to unnecessary delays in the prosecution of the application.

Prior to focusing on specific statutory requirements, Office personnel must begin examination by **determining what, precisely, the applicant has invented** and is seeking to patent, and how the claims relate to and define that invention. (As the courts have repeatedly reminded the Office: "The goal is to answer the question 'What did applicants invent?' " In re Abele, 684 F.2d 902, 907, 214 USPQ 682, 687. Accord, e.g., Arrhythmia Research Tech. v. Corazonix Corp., 958 F.2d 1053, 1059, 22 USPQ2d 1033, 1038 (Fed. Cir. 1992).) ...

In determining what has been invented, the Examiner is requested to take into account the entirety of the originally-filed application. Specifically, Applicants have shown that orientation of the polarization direction relative to the direction of a groove affects reflection and/or absorption of the incident energy by the groove, as discussed in the originally-filed specification, for example, at page 7, lines 7-23. Ushio et al. fail to even recognize the problem caused by polarization direction being parallel to the groove (at least because Ushio et al. fail to disclose a specific polarization direction). Hence, Ushio et al. fail to identify a solution as recited in Claim 1 (i.e. non-parallel orientation of the polarization direction relative to the feature).

If the Examiner continues to reject Claim 1 over the teachings of Ushio et al., Applicants respectfully request the Examiner to provide a specific column number and line number wherein Ushio et al. teach the above-described non-parallel orientation of the polarization direction.

Moreover, Applicants respectfully traverse the Examiner's rejection of Claim 48 as being anticipated by Ushio et al. Claim 48 is believed to be patentable for at least the same reasons as those discussed above for Claim 1. In addition, Claim 48 requires that a portion of the light polarized perpendicular to the groove is converted into heat and the heat is transmitted into a substrate of the semiconductor wafer. In fact the word "heat" (although recited in originally-filed Claim 48) is not found anywhere in the Examiner's remarks, in the bottom half of page 2 and top half of page 3 of the Final Office Action. Therefore, the Examiner failed to make a prima facie case of anticipation rejection of originally-filed Claim 48.

Furthermore, towards the bottom of page 2 of the Final Office Action, the Examiner analogized layer 64 of Ushio et al.'s structure as being the trace of reflective material and also as the layer that is partially transmissive. There appears to be an inconsistency in the Examiner's characterization of a single layer 64 as being both reflective and partially transmissive.

Moreover, Applicants submit that layer 64 is described by Ushio et al. as being a dielectric layer (e.g. 390 nm thick SiO<sub>2</sub> is identified at column 22, line 32 of Ushio et al.). Hence, as would be apparent to the skilled artisan, layer 64 is nearly transparent to probe light 33 (i.e. there is almost no absorption). Shining probe light 33 on Ushio et al.'s layer 64 would not cause any measurable heating from absorption. Also, such a layer 64 has very low thermal conductivity, so any heat flow in layer 64 is negligible, and hence it is unlikely that there is a measurable temperature distribution that is proportional to the layer's cross-section (and, hence, thickness).

In contrast to Ushio et al.'s layer 64, Claim 48 (as amended) recites that the groove is formed of a highly reflective material. An example of this material is described in the originally-filed specification at page 9, line 4 as being a metal, such as copper. Claim 48 is further amended to state that light absorbed in the groove measurably reduces the reflected light. As will be apparent to the skilled artisan in view of Applicants' originally-filed specification, such a measurable change in reflected light depends on the orientation of polarization direction relative to the




longitudinal direction of the groove. Such a relationship is nowhere disclosed or suggested by Ushio et al.

For the above reasons, Applicants respectfully request allowance of all pending claims. Should the Examiner have any questions concerning this response, the Examiner is invited to call the undersigned at (408) 982-8200, ext. 3.

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